

- I. Complete the following passage by inserting the most suitable terms in the blank spaces.

Mitosis is a type of nuclear division and can be observed using a light microscope. In the first stage, known as ....., the chromosomes become visible. Each chromosome is seen as two chromatids joined at the .....

The nuclear ..... breaks down, a spindle is formed and the ..... line up at the equator.

During the stage known as ..... the chromatids separate, one of each pair moving to opposite ..... of the spindle.

Separate nuclei are formed. The cytoplasm is then shared between the daughter cells in a process known as .....

These two cells are ..... identical.

[Total 8 marks]

2. The haploid number of chromosomes for a human is 23.

- (i) State the number of chromosomes present in the nucleus of the liver cell.

.....

[1]

- (ii) Name the type of nuclear division that produced this liver cell.

.....

[1]

[Total 2 marks]

3. (a) Describe the role of mitosis.

.....

.....

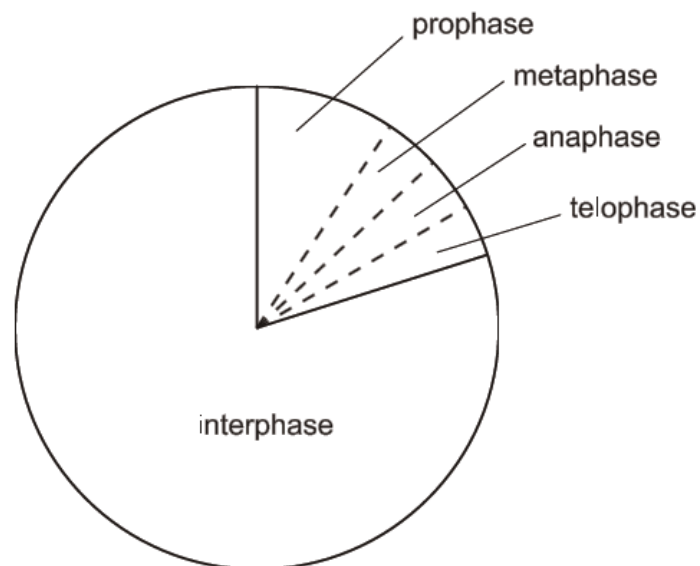
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.....

[3]

Below is a diagram that shows the stages of the mitotic cell cycle.



- (b) (i) Which processes must occur in a cell during interphase before mitosis can take place?

.....

.....

.....

.....

.....

[3]

- (ii) Draw an arrow on the diagram to indicate the sequence in which the stages occur during the mitotic cell cycle.

[1]

- (c) Name the stage of mitosis shown in the diagram in which each of the following events occurs.

- (i) Chromosomes split at centromeres.

.....

[1]

- (ii) Chromosomes become visible.

.....

[1]

- (iii) Nuclear envelope re-forms.

.....

[1]

- (iv) Chromatids move to opposite poles of the cell.

.....

[1]

- (v) Chromosomes line up along the equator of the spindle.

.....

[1]

[Total 12 marks]

4. Name the stage of mitotic cell division during which each of the following takes place.

(i) Nuclear envelope reforms.

.....

[1]

(ii) Chromosomes align at equator.

.....

[1]

(iii) Chromosomes become visible.

.....

[1]

(iv) Chromatids move towards the poles.

.....

[1]

(v) Spindle microtubules shorten.

.....

[1]

[Total 5 marks]

5. (a) Name the stage of the mitotic cell cycle in which each of the following takes place:

(i) chromosomes become visible as two chromatids

.....

[1]

(ii) DNA replicates

.....

[1]

(iii) nuclear envelope reforms.

.....

[1]

(b) During mitosis, chromosomes line up at the equator of the cell.

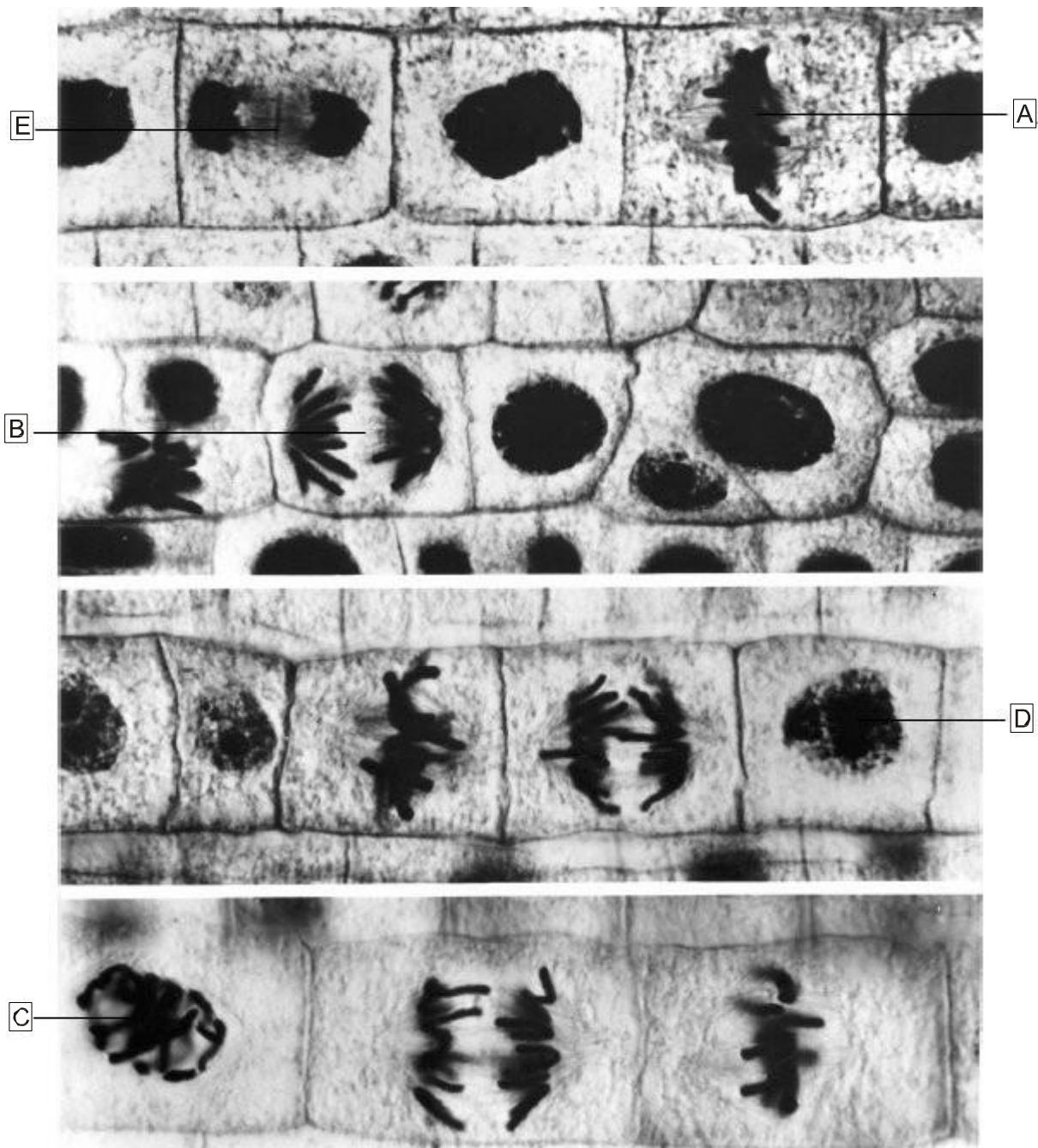
Describe what happens to chromosomes after this, until the nuclear envelope reforms.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

[4]

[Total 7 marks]

6. Four light micrographs of onion cells undergoing mitosis are shown below.



Biophoto Associates

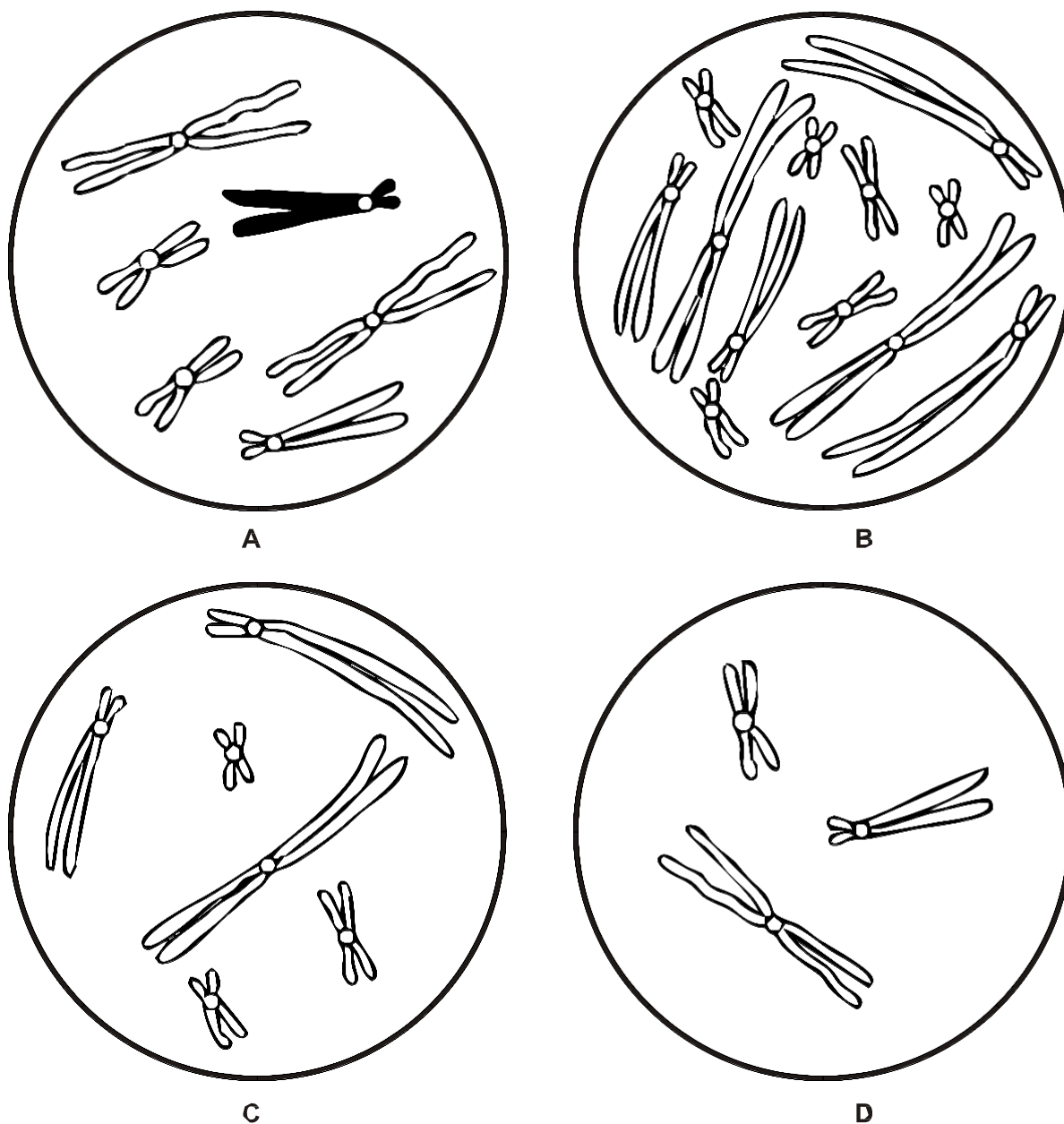
In this question, one mark is available for the quality of the use and organisation of scientific terms.

Outline what happens to chromosomes during the mitotic cell cycle. You will gain credit if you refer to the labelled cells in the micrographs.

*[The page contains faint, illegible horizontal lines suggesting ghosting or extremely faded text.]*

[Total 10 marks]

7. The diagram below shows drawings of nuclei, **A** to **D**, from two different plant species seen in the prophase stage of mitosis.



- (a) On drawing **A**, one of a pair of homologous chromosomes has been shaded. Shade in the other member of the pair.

[1]



- (b) (i) Name the stage in mitosis that **immediately** follows prophase.

.....

[1]

- (ii) Describe the behaviour of the chromosomes in this stage.

.....

.....

.....

.....

[2]

- (c) The diploid number for crocus, *Crocus balansae*, is **6** and the diploid number for broad bean, *Vicia faba*, is **12**.

State which of the drawings, **A**, **B**, **C** or **D**, shown in the diagram, represents the following:

haploid cell of broad bean .....

root tip cell of crocus .....

[2]

[Total 6 marks]

8. The figure below is a diagram of a mammalian sperm cell.



Explain how the structure of the sperm cell is specialised for carrying out its role.

.....

.....

.....

.....

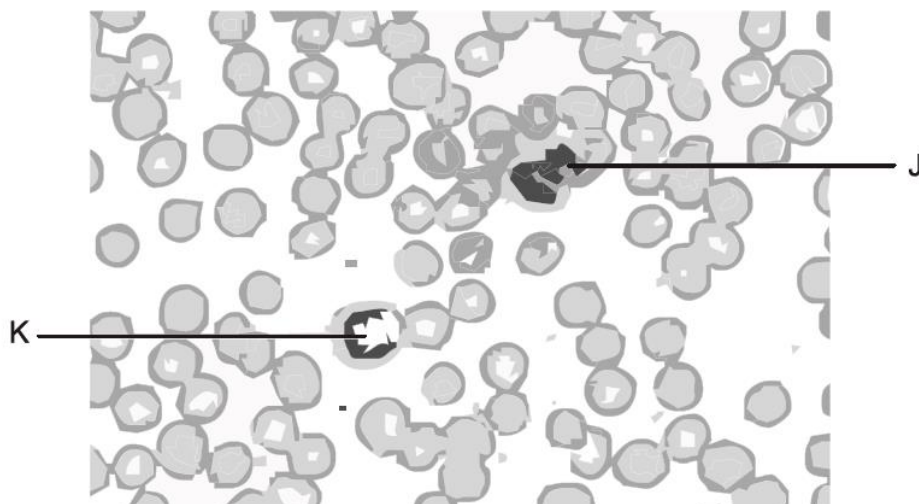
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[Total 3 marks]



**10.** Below is a diagram of blood showing both red and white blood cells.

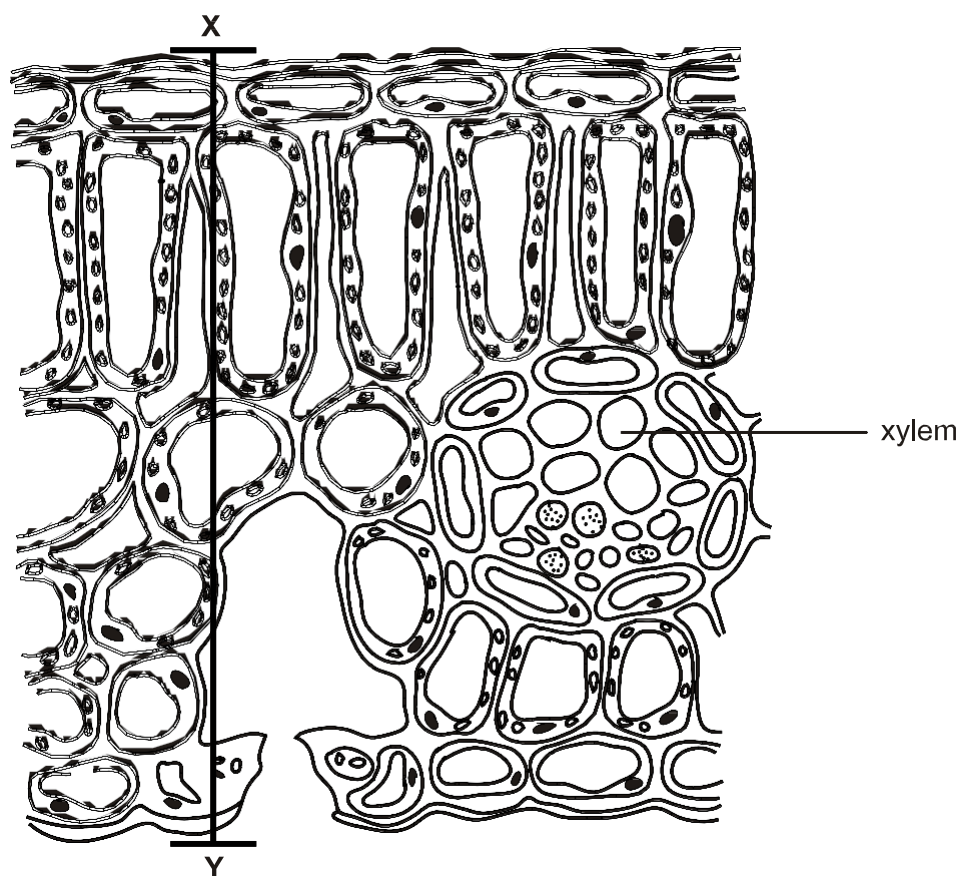


Complete the table below to give the name and function of the white blood cells labelled **J** and **K**.

cell	name	function
<b>J</b>		
<b>K</b>		

[Total 4 marks]

- II. (a) The diagram below is a drawing of a vertical section of part of a dicotyledonous leaf.



- (i) Use label lines and the letters **P**, **E** and **C** to indicate the following on the diagram.

**P** a palisade mesophyll cell

**E** a lower epidermal cell

**C** cuticle

[3]

- (ii) The distance **XY** represents an actual distance of 0.7 mm.

Calculate the magnification of the drawing. Show your working.

Answer = .....

[2]

- (b) Explain why xylem is described as a *tissue*.

.....

.....

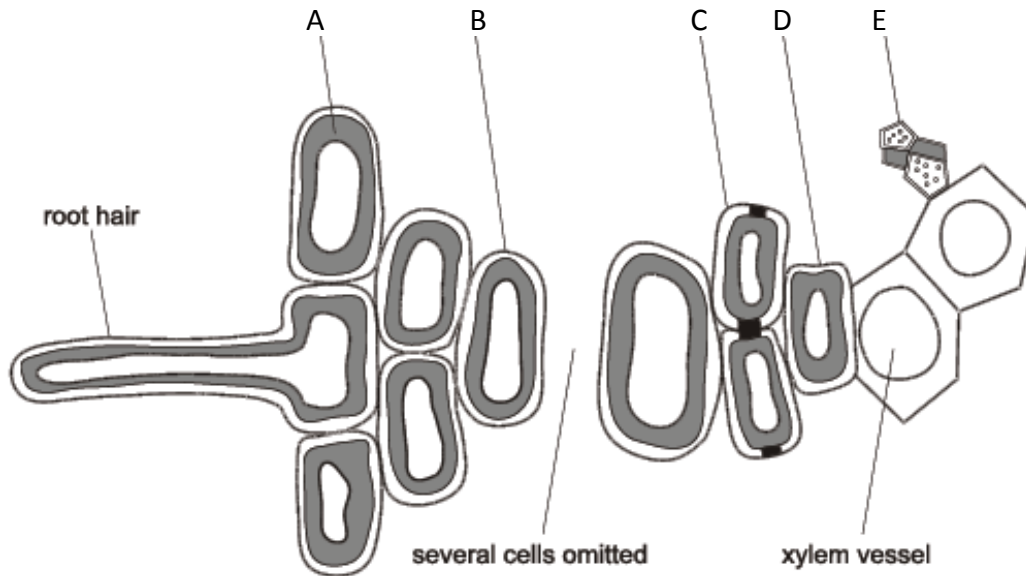
.....

.....

[2]

[Total 7 marks]

12. The figure below is a diagram showing some of the cells in the root of a dicotyledonous plant.



- (a) Complete the table below by indicating which of the letters **A** to **E** indicates:

- a cell from the endodermis
- a cell from the phloem.

	letter
endodermis	
phloem	

[2]

- (b) State **two** features of root hair cells which adapt them for water uptake.

1 .....

2 .....

[2]

- (c) In this question, one mark is available for the quality of spelling, punctuation and grammar.

Plants absorb water from the soil via their roots.

Describe the pathways **and** mechanisms by which water passes from the soil to the xylem vessels in the root.

This image shows a full page of white paper with horizontal dashed lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Quality of Written Communication [1]

Describe how **two** features of xylem vessels adapt them for water transport.

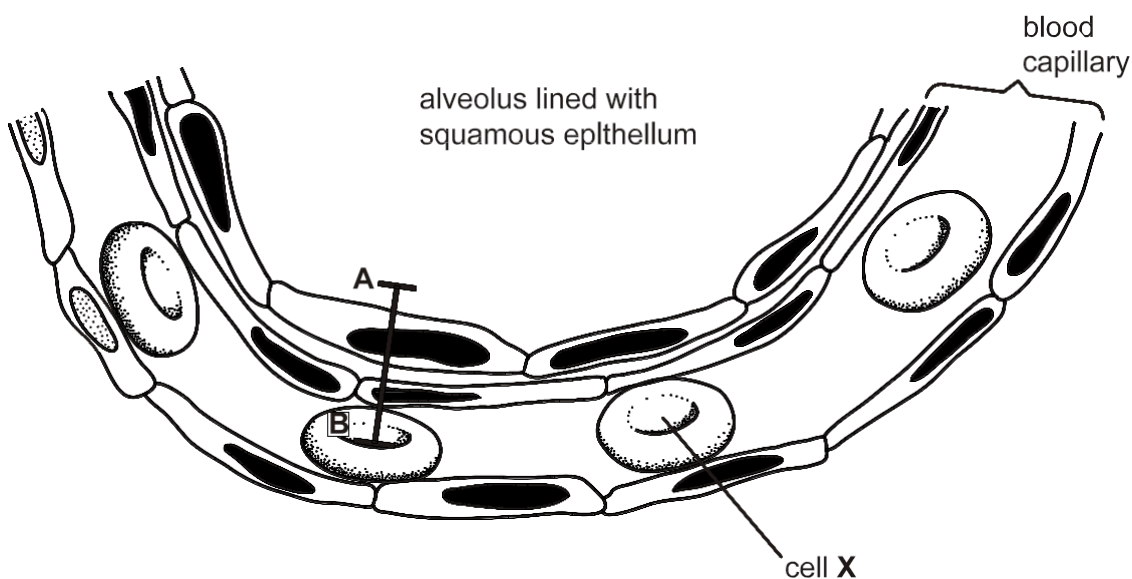
1 .....

2 .....

[Total 15 marks]



13. The diagram below is a drawing of an alveolus together with an associated blood capillary.



- (i) State a feature, **visible in the diagram**, which shows that squamous epithelial cells are eukaryotic.

.....

[1]

- (ii) State why squamous epithelium is described as a tissue.

.....

.....

[1]

- (iii) State **two** features of a gas exchange surface, such as the lining of the alveolus.

1 .....

2 .....

[2]

[Total 4 marks]

- 14.** (i) Explain the meaning of the term *tissue*.

.....

.....

.....

[2]

- (ii) Name **one** example of a plant tissue.

.....

[1]

[Total 3 marks]

- 15.** State the word or phrase that best describes a structure made up of different types of tissue working together to perform a particular function.

.....

[Total 1 mark]